

Commonwealth of Pennsylvania
Pennsylvania Fish and Boat Commission
October 7, 2014

Subject: Results of 2014 Fish Tissue Sampling
Kaercher Creek Lake, Windsor Township, Berks County

To: David E. Spotts, Chief
Division of Environmental Services

From: Mark A. Hartle, Chief
Aquatic Resources Section
Division of Environmental Services

In 1990, the Pennsylvania Fish and Boat Commission (PFBC) was made aware of buried battery casings within its Kaercher Creek Lake property. In 1991, PFBC personnel tested Largemouth Bass (*Micropterus salmoides*) and Bluegill (*Lepomis macrochirus*) tissue for lead analysis (Spotts, 1991). Yellow Bullhead (*Ictalurus natalis*) tissue and lake sediment samples were additionally sampled in 1992 for lead analyses (Spotts, 1993). The results of these two investigations revealed that the fish were safe to consume and the lead concentrations within Kaercher Creek Lake sediments were similar to background levels of other soils within that geographic region of the Commonwealth.

In 2013, the U.S. EPA required a removal action for lead contaminated soil in a 2 to 3 acre wooded area on the north side of Kaercher Creek Lake (Figure 1). The PFBC made the decision to again sample fish from two trophic levels, invertivore and omnivore, within Kaercher Creek Lake to determine if levels of metals in fish tissue were acceptable for human consumption.

Methods

Fish were collected on May 28-29, 2014 using trotlines, fyke nets and angling for tissue samples. Collections were made following the Department of Environmental Protection (DEP) Fish Tissue Sampling Protocol. Two Channel Catfish (*Ictalurus punctatus*) of 521 and 559 mm total length were collected to represent the omnivore trophic level sample most closely associated with bottom sediment. Five Bluegills, ranging from 184 to 197 mm in length, were collected to complete the invertivore sample.

Channel Catfish were filleted with skin on and packaged in foil and placed in a Zip-Loc bag. The Bluegills were scaled and skin-on fillets were placed in foil and then a separate bag. All samples were immediately stored in a cooler on ice and hand-delivered to the DEP Laboratory on May 29, 2014 for analysis.

Results

The DEP Laboratory analyzed the two tissue samples for metals, standard Analysis Code 059. Results from analyses are attached and are summarized as follows:

Sample 6709400 – Two Channel Catfish, fillets skin-on

Results were reported as wet weight.

Barium, cadmium and selenium concentrations were below laboratory detection limits.

The following concentrations were reported:

Chromium	0.255 µg/g (= mg/kg = ppm)
Copper	0.946 µg/g
Lead	0.060 µg/g
Mercury	0.025 µg/g

Sample 6709401 – Five Bluegills, scaled skin-on fillets

Results were reported as wet weight.

Barium, cadmium and selenium concentrations were below laboratory detection limits.

The following concentrations were reported:

Chromium	0.343 µg/g (= mg/kg = ppm)
Copper	0.804 µg/g
Lead	0.076 µg/g
Mercury	0.041 µg/g

Discussion

Soil samples taken by Weston Solutions, Inc. (2013) showed that two to three acres of soil was contaminated with 500 to greater than 1000 ppm lead due to placement of fill contaminated with battery casing fragments and lead prior to PFBC acquisition of the Kaercher Creek Lake property. The most heavily contaminated area was west of the parking lot and boat launch. Samples taken nearest to the lake averaged less than 100 ppm soil concentrations of lead, with the exception of the area at the northwest corner of the embayment near the boat launch showed 117 to 325 ppm lead at 6 and 12 inches depth respectively. Lake sediments were not sampled but the Weston Solutions (2013) results suggested little migration outward from more highly contaminated areas that were concentrated on the south-facing slope as the wooded area descended toward the lake.

DEP routine samples (unpublished data) of fish tissue taken periodically from Kaercher Creek Lake were collected by PFBC on October 17, 2012 and processed by DEP on May 2013. Five White Crappies (*Poxomis annularis*) yielded scaled, skin-on fillet samples for analysis of pesticides, PCBs and metals. Results were as follows:

Pesticides—All analytes except 4,4'-DDE (95.109 µg/kg) at nondetectable concentrations.

PCBs—All arochlors at nondetectable concentrations

Metals - Barium, cadmium lead, selenium and strontium concentrations were below laboratory detection limits. Other results were:

Chromium	0.171 µg/g (= mg/kg = ppm)
Copper	0.220 µg/g
Mercury	0.035 µg/g

Kaercher Creek Lake Channel Catfish and Bluegill tissue samples analyzed for metals from as part of this study were safe for human consumption and showed very low concentrations of lead in fish tissue. Additionally, White Crappie fish tissue samples taken in 2012 were safe for human consumption. PCBs and pesticides did not pose an environmental or human health risk. Fish containing 5.0 ppm DDE should not be consumed according to the U.S. EPA (2014). The 2012 Kaercher Creek Lake sample was well below this concentration.

The U.S. Food and Drug Administration (2014) has established an action level of 1 ppm mercury above which fish should not be consumed, but no other metals are regulated in this fashion. Kaercher Creek fish are well below this threshold. Cadmium and lead are regulated by the FDA (2011) in eating utensils at concentrations of 0.5 and 3 µg/ml leaching solution, respectively. Lower concentrations are required in storage vessels to minimize human exposure during storage, serving and eating. Fish tissue concentrations of lead, cadmium, chromium and copper for human consumption are not regulated by the state or federal government. Beyer et al. (1996) indicate that toxic effects of metals in aquatic invertebrates are not related to tissue concentrations, but whether the intake rate exceeds the detoxification and excretion capabilities of the organisms. These capabilities can vary widely within closely related taxa. Chromium toxicity varies according to the metal speciation present and availability of metals can change due to ambient conditions such as low or high pH. Lack of a fish tissue consumption threshold for metals other than mercury and absence of a relative scale of aquatic and human risk for metals in fish tissue makes further data interpretation an unproductive venture.

In conclusion, Kaercher Creek fish sampled in 2012 and 2014 can be safely consumed by humans. Staff recommend the same consumption frequency of one meal per week as the PFBC (2014) statewide fish consumption advisory.

Attachments

c: M. Kaufmann, Fisheries Management Area 6
R. Bednarchik, SE Region Law Enforcement Manager
Josh Lookenbill, DEP Water Quality Standards Division
Kristen Bardell, Water Pollution Biologist, DEP SC Region

References

- Beyer, W. N., G. H. Heinz and A. W. Redmon-Norwood. 1996. Environmental Contaminants in wildlife: Interpreting tissue concentrations. Lewis Publishers. New York. 493 p.
- Pennsylvania Fish and Boat Commission. 2014. 2014 Pennsylvania fishing summary: Summary of fishing regulations and laws. Harrisburg, PA. 47 p.
- Spotts, D. E. 1991. Kaercher Creek Lake Fish Tissue Report. Pennsylvania Fish and Boat Commission, 450 Robinson Lane, Bellefonte, PA.
- Spotts, D. E. 1993. Kaercher Creek Lake Fish Tissue and Sediment Results. Pennsylvania Fish and Boat Commission, 450 Robinson Lane, Bellefonte, PA.
- Weston Solutions, Inc. 2013. Final Trip Report: Kaercher Creek Park assessment and extent of contamination investigation, Kaercher Creek Park – Lake Site, Windsor Township, Berks County, Pennsylvania. Report to U. S. Environmental Protection Agency Region III Hazardous Site Cleanup Division. West Chester, PA. 11 p.

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U.S. Food and Drug Administration. 2011. Appendix 5: FDA and EPA Safety Levels in Regulations and Guidance *in* Fish and Fishery Products Hazards and Controls Guidance, 4th ed. Rockville, Md.

U.S. Food and Drug Administration. 2014. Guidance for Industry: Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed. Found online July 24, 2014 at <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ChemicalContaminantsMetalsNaturalToxinsPesticides/ucm077969.htm>

Figure 1. Fish tissue sampling locations on May 28-29, 2014 at Kaercher Creek Lake, Windsor Township, Berks County, PA.



6709400 Channel Catfish filets



Date of Issue: 07/04/2014 04:04:06
 DEP Bureau of Laboratories - Harrisburg
 P.O. Box 1467
 2575 Interstate Drive
 Harrisburg, PA 17105-1467
 Contact Phone Number: (717) 346-7200

NELAP - accredited by
 NJ DEP - Laboratory Number: PA059
 PA DEP LAP - DEP Lab ID: 22-00223

Analytical Report For
 PA Fish Commission

Sample ID: 6709 400 Date Collected: 05/29/2014 10:00:00 AM Lab Sample ID: I2014017210 Status: Completed

Name of Sample Collector: FES Statewide

Date Received:

County: NOT INDICATED

State:

Municipality: NOT INDICATED

Location: NOT INDICATED

Reason: Pollution Incident

Project: NOT INDICATED

Standard Analysis: 059

Matrix: Fauna

Stream Condition:

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
71946 Ba in fish, wet wt	<1.25 UG/G	05/26/2014 09:10 AM	CGASTON	EPA 6010 C
71940 Cadmium in fish, wet weight	<0.005 UG/G	05/26/2014 09:10 AM	SCHOY	EPA 6020
71939 Chromium in fish, wet weight	0.255 UG/G	05/26/2014 09:10 AM	SCHOY	EPA 6020
71937 Copper in fish, wet weight	0.946 UG/G	05/26/2014 09:10 AM	SCHOY	EPA 6020
99014 Fish preparation, no grinding****	0 Each	05/26/2014 09:10 AM	SCHOY	
71936 Lead in fish, wet weight	0.060 UG/G	05/26/2014 09:10 AM	SCHOY	EPA 6020
71930 Mercury in fish, wet weight****	0.025 UG/G	05/26/2014 09:10 AM	LOJEDA	EPA 7471 A
71945 Selenium in fish, wet weight	<1 UG/G	05/26/2014 09:10 AM	SCHOY	EPA 6020

6709400 Channel Catfish fillets

Analytical Report For
PA Fish Commission

Sample ID: 6709 400

Date Collected: 05/29/2014 10:00:00 AM

Lab Sample ID: I2014017210

Status: Completed

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
71947 SR IN FISH, Wet weight	<1.25 UG/G	05/26/2014 09:10 AM	CGASTON	EPA 6010 C

The results of the analyses provided in this laboratory report relate only to the sample(s) identified therein. Unless otherwise noted, the results presented on this laboratory report meet all requirements of the 2009 TNI standard. Sample was in acceptable condition when received by the Laboratory. Any exceptions are noted in the report.

* denotes tests that the laboratory is not accredited for

** Laboratory is accredited by NJ NELAP, parameter not offered by PA LAP

Taru Upadhyay, Technical Director, Bureau of Laboratories

6709401 Bluegill fillets



Date of Issue: 07/04/2014 04:08:47

DEP Bureau of Laboratories - Harrisburg
 P.O. Box 1467
 2575 Interstate Drive
 Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

NELAP - accredited by

NJ DEP - Laboratory Number: PA059
 PA DEP LAP - DEP Lab ID: 22-00223

Analytical Report For
 PA Fish Commission

Sample ID: 6709 401

Date Collected: 05/29/2014 11:00:00 AM

Lab Sample ID: I2014017211

Status: Completed

Name of Sample Collector: FES Statewide

Date Received:

County: NOT INDICATED

State:

Municipality: NOT INDICATED

Location: NOT INDICATED

Reason: Pollution Incident

Project: NOT INDICATED

Standard Analysis: 059

Matrix: Fauna

Stream Condition:

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
71946 Ba in fish, wet wt.	<1.25 UG/G	06/26/2014 09:10 AM	CGASTON	EPA 6010 C
71940 Cadmium in fish, wet weight	<0.005 UG/G	06/26/2014 09:10 AM	SCHOY	EPA 6020
71939 Chromium in fish, wet weight	0.343 UG/G	06/26/2014 09:10 AM	SCHOY	EPA 6020
71937 Copper in fish, wet weight	0.804 UG/G	06/26/2014 09:10 AM	SCHOY	EPA 6020
99014 Fish preparation, no grinding****	0 Each	06/26/2014 09:10 AM	SCHOY	
71936 Lead in fish, wet weight	0.076 UG/G	06/26/2014 09:10 AM	SCHOY	EPA 6020
71930 Mercury in fish, wet weight****	0.041 UG/G	06/26/2014 09:10 AM	LOJEDA	EPA 7471 A
71945 Selenium in fish, wet weight	<1 UG/G	06/26/2014 09:10 AM	SCHOY	EPA 6020

6709401 Bluegill fillets

Analytical Report For
PA Fish Commission

Sample ID: 6709 401

Date Collected: 05/29/2014 11:00:00 AM

Lab Sample ID: I2014017211

Status: Completed

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
71947 SR IN FISH, Wet weight	<1.25 UG/G	06/26/2014 09:10 AM	CGASTON	EPA 6010 C

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Taru Upadhyay, Technical Director, Bureau of Laboratories